Flank Pain, Nausea, Vomiting and Hypotension in a Chronic Hemodialysis Patient with a Spontaneous Perirenal Hemorrhage

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Abstract

Decreases in blood pressure (BP) develop in response to a wide range of clinical disorders. Various factors have been implicated in the development of hemodialysis-associated hypotension, including an impairment of the compensatory processes, an autonomic dysfunction or cardiac failure. The additional presence of concomitant acute abdomen may result in a diagnostically challenging situation. We herein report our experience with a chronic hemodialysis patient who developed severe hypotension with acute flank pain due to spontaneous bleeding around the kidney. Concerns regarding the management of the disease are also discussed.

Key words: perirenal hemorrhage, hemodialysis, hypotension, Wunderlich syndrome

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Introduction

Decreases in blood pressure (BP) develop in response to a wide range of clinical disorders. Various factors have been implicated in the development of hemodialysis (HD)-associated hypotension, including an impairment of the compensatory processes, an autonomic dysfunction or cardiac failure (1, 2). The additional presence of concomitant acute abdomen may result in a diagnostically challenging situation. We herein report our experience with a chronic HD patient who developed severe hypotension with acute right flank pain due to spontaneous bleeding around the kidney.

Case Report

A 67-year-old woman uneventfully completed a routine HD session and presented six hours later at an emergency hospital with an acute onset of right flank pain, nausea and vomiting with no history of trauma. She had been managed with HD for the previous two years because of end stage renal disease (ESRD) due to hypertensive nephrosclerosis. Her predialysis and postdialysis BP had been controlled to the ranges of 150-190/60-80 mmHg and 130-180/60-80 mmHg, respectively, with oral carvedilol at a dose of 10 mg/day. During the HD treatment, she had been administered heparin for anticoagulation. She was alert upon arrival, with a decreased BP of 48/27 mmHg, a hemoglobin (Hb) level of 8.1 g/dL and hematocrit (Hct) of 25.4%, with a normal prothrombin time of 13 seconds and an activated partial thromboplastin time of 30.1 seconds. Plain computed tomography (CT) scanning immediately showed an extensive right perinephric collection, suggesting the presence of a massive hematoma around the right kidney (Figure A). Then, she was transferred to our hospital for further work-up. The laboratory analysis revealed a platelet count of 11.9×10⁴/μL, a serum creatinine level of 2.64 mg/dL, and Hct to 17.7%, with an increased fibrinogen degradation product level of 152.5 μg/mL and a D-dimer level of 91.2 μg/mL. Repeated enhanced CT scans revealed a right perirenal extravasation of contrast media, which was indicative of active bleeding from the right kidney (Figure B). Under blood transfusion and vigorous...
Various intravenous fluid repletion, she was further subjected to selective right renal arteriography and super-selective renal arteriography with a 1.9-Fr microcatheter (Progreat® , Terumo, Tokyo, Japan), which confirmed the presence of leakage of the contrast media from the small branches of the renal artery at the superior portion of the right kidney (Figure C). Therefore, transcatheter arterial gelatin sponge embolization (Spongel® , Astellas Pharma Inc., Tokyo, Japan) was performed, thus leading to interruption of the renal bleeding. However, bleeding reoccurred two days later and was successfully controlled with subsequent endovascular embolization (Figure D) using n-butyl 2-cyanoacrylate (NBCA) (Histoacryl® , B.Braun, Melsungen, Germany) mixed with a radio-opaque contrast agent Lipiodol® (Laboratoire Guerbet, Roissy, France). The ratio of Lipiodol® to NBCA was 4:1, and the total volume injected was 2.5 mL. Radical nephrectomy of the right kidney was finally performed on the eleventh hospital day.

There was no macroscopic evidence of a renal parenchymal fissure in the removed kidney; however, a sporadic hemorrhage was confirmed within the atrophic renal parenchyma. A further pathological work-up failed to confirm the presence of hemorrhagic cysts. There was also no evidence of a connection angiomyolipoma, and malignant tissue could not be found. The major arteries and arterioles were sclerotic; however, we failed to confirm the presence of histological changes compatible with vasculitis. The patient had an unremarkable recovery and the periodic HD program was continued.

**Figure.** Radiographic findings. The plain CT scan (A) showed an extensive right perinephric collection, while an enhanced CT scan (B) revealed the right perirenal extravasation of contrast media (arrow). Prior to gelatin sponge embolization, the leakage of contrast media from the renal artery (arrowhead) was observed (C). Following an NBCA embolization that was performed two days after the initial embolization, the extravasation of contrast media was no longer observed (D).

**Discussion**

Intradialytic hypotension is a serious problem associated with mortality in chronic HD patients (1, 2). Acute abdomen is another medical condition that may be caused by a myriad of diagnoses, including perirenal bleeding, and carries high risks of mortality and morbidity in patients on periodic HD programs (3-6). In this regard, thorough knowledge of the etiologic spectrum of hypotension and acute abdominal pain is of utmost importance. Chronic HD patients with perirenal bleeding are not exceptional; however, such patients do not necessarily demonstrate a reduced BP (6). This is also the case with subjects who are not treated with renal replacement therapy (7). Therefore, it is necessary to keep in mind that there may be an etiological link between the perirenal bleeding and the hemodynamic instability that can be associated with acute abdominal pain, as described herein.

Spontaneous perirenal bleeding, which has been designated as Wunderlich syndrome, is a potentially fatal clinical entity caused by renal bleeding, or, much less commonly, by
bleeding from adjacent retroperitoneal structures (6-11). Mitutinovich et al. reported an incidence of 3% for spontaneous retroperitoneal bleeding in patients on chronic HD in their unit more than three decades ago (12). Anecdotal information regarding such cases has continued to accumulate worldwide, including in Japan (7, 13, 14). Therefore, the precise incidence of spontaneous perirenal bleeding syndrome among patients with ESRD remains to be elucidated.

Based on the limited literature containing any demographic information of the disease (7-9, 15-19), various etiologies have been suggested (Table). Neoplasms such as renal cell carcinoma and angiomyolipoma seem to be a major etiology for spontaneous perirenal bleeding in general population, while arteriovenous malformation, renal artery aneurysms induced by vasculitis, renal infarction and abscesses have also been considered to be implicated in the condition (8, 9, 15-19). On the other hand, acquired cystic kidney disease (ACKD) is regarded as the most frequent underlying cause among subjects with ESRD (7, 19). Bleeding based on the presence of cystic lesions may be due to the rupture of unsupported sclerotic vasculature within the cyst wall, which can be accelerated by persistent hypertension (19). Moreover, the anticoagulation used for the HD treatment, in addition to functional platelet abnormalities, may also act as a contributory factor among such subjects, thereby resulting in perinephric hemorrhage (7, 12, 20, 21). Therefore, the clinical characteristics, including the etiological background of the disease, in subjects with ESRD and those without ESRD may need to be evaluated separately. Indeed, a male predominance has been demonstrated in subjects with ESRD, but not in those without ESRD (7-9, 18), and such a predominance may also be the case in Japanese chronic HD populations (13, 14). The reasons for this finding remain to be determined; however, they may be ascribed to the male predominance of ACKD as well as the larger size and more marked progression of the cysts in male subjects (7, 22). In contrast, no data are available supporting the impact of the underlying renal disease on the development of spontaneous perirenal bleeding in ESRD subjects despite the presence of one anecdotal case report that described the disease to be associated with hypertensive nephrosclerosis (7, 23).

In the current case, the fact that the renal bleeding occurred just after undergoing HD day led us to consider that the heparinization therapy administered during the latest HD session might have played a role, at least in part, in our patient’s hemorrhagic episode (7, 12, 20, 21). Since neither hemorrhagic cysts nor cysts connected to the hematoma were noted during the pathological work-up, the significance of cystic lesions on the bleeding episode is likely to have been marginal. Instead, the atherosclerotic changes in the kidney vasculature that were confirmed in the current patient may have been involved in the pathogenic process of the development of the renal bleeding (24). Therefore, the clinical impact of ACKD on the development of the disease among the overall population of ESRD patients should be evaluated more carefully.

The mainstay of treatment for renal bleeding consists of bed rest, blood transfusions and the discontinuation of anticoagulants, with adequate monitoring of the blood pressure and Hb levels. Depending on the clinical circumstances of the patients, radiological intervention might also be required. However, the variability in the treatment methods has made it difficult to develop optimal practice recommendations (18, 25, 26). Currently, various embolic agents, including gelatin sponges, coils, polyvinyl alcohol particles and NBCA, are available for the percutaneous treatment of such renal vascular lesions, and the efficiency of such treatment depends on the appropriate choice of embolization material (27). Although the procedure using resorbable gelatin sponges is inadequate for achieving definitive renal embolization, it may also occasionally be useful in certain situations, such as renal trauma, in which transient embolization may be adequate to interrupt the retroperitoneal bleeding (28). In contrast, numerous authors have reported limited success with gelatin sponges, showing temporal embolization and late recanalization (25). This was also the case in the current patient. Indeed, she required subsequent embolization with an NBCA mixture, which has been reported to be an effective and minimally invasive tissue-preserving method for treating various renovascular injuries (27).

The high prevalence of renal carcinomas among patients with spontaneous renal bleeding might suggest radical nephrectomy to be the most appropriate management (24, 29). Conversely, one may argue that the patients with such disease can be followed carefully and noninvasively with recurrent radiological studies, such as CT scanning, thus suggesting that aggressive surgical intervention is not justified (14, 30). In our patient, it was difficult to pre-
ciscely evaluate her for the presence of renal carcinoma by imaging techniques due to the hemorrhagic nature of the kidney (30, 31). Therefore, a radical nephrectomy was finally performed despite achieving successful bleeding control by consecutive rounds of renal arterial embolization. As a reference, Malek-Marín et al. reported the existence of malignancy to be found in 6 out 55 chronic HD patients with spontaneous retroperitoneal bleeding (7), while 13 of 66 chronic HD patients in a Japanese population were found to have renal cell carcinoma (14).

Currently, there are no clear recommendations regarding either the acceptance or deferral of radical nephrectomy in cases with spontaneous renal bleeding that has been successfully controlled by interventional radiology. Therefore, the management of perirenal hematomas originating from renal bleeding among HD patients must still be individualized. Evaluating the clinical characteristics of this clinical entity may provide information that will aid in the understanding of the pathogenesis of the diseases associated with ESRD and thereby provide novel therapeutic strategies. However, this will depend on the accumulation of more experience with additional cases similar to ours.

The authors state that they have no Conflict of Interest (COI).

References